PURDUE
ENGINEERING

ENVIRONMENTAL AND ECOLOGICAL ENGINEERING

purdue.edu/EEE

Environmental and Ecological Engineering: A Modern Approach to Environmental Engineering

John W. Sutherland, Ph.D.

Professor and Fehsenfeld Family Head

Environmental and Ecological Engineering

Purdue University

jwsuther@purdue.edu

PURDUE ENVIRONMENTAL & ECOLOGICAL ENGINEERING

History of Environmental Engineering at Purdue

- History of excellence
- Environmental and Ecological Engineering (EEE) established in 2006
- Charge: establish undergraduate and graduate curricula, promote research collaborations, and assume leadership in environmental issues
- BS Degree approved by Indiana in Fall 2012
- Inaugural class of 10 graduates in May 2013
- BS degree is ABET accredited
- Graduate program approved by State in August 2015

What is EEE?

- Modern approach to environmental engineering – strong emphasis on “the sciences” and systems engineering – protect human and environmental health
- Unique in addressing environmental engineering and industrial sustainability. Address environmental problems at source
- Name highlights emphasis on the management of complex problems considering both environmental issues and ecological interactions

PURDUE ENVIRONMENTAL & ECOLOGICAL ENGINEERING

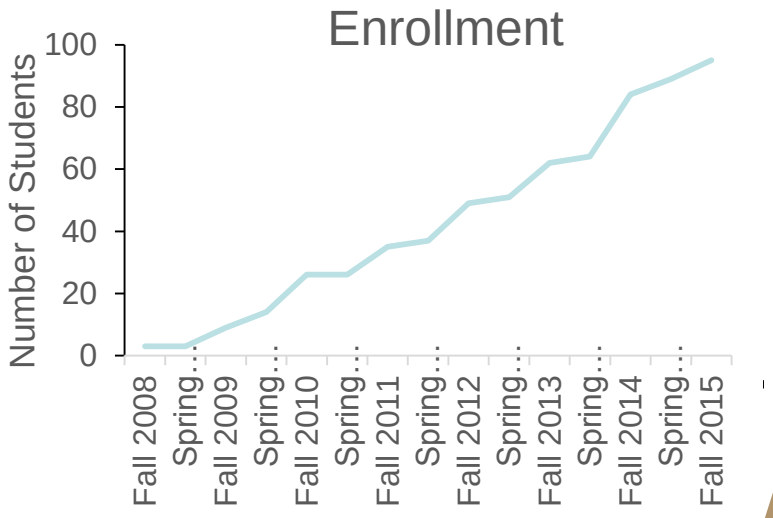
EEE vs Environmental Engineering

"Wastes can no longer be tolerated as an accepted part of doing business." J.W. Sutherland (1993)

- EEE revolutionizes environmental engineering by integrating principles and methods for: i) core environmental engineering, and ii) industrial sustainability.
- Attacking root causes, innovating to avoid wastes, attacking root causes, and closing material loops are important elements of EEE's new approach to environmental engineering.

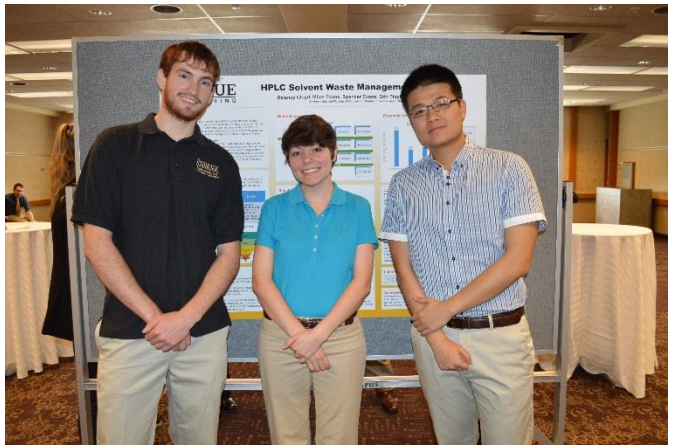
Undergraduate Program

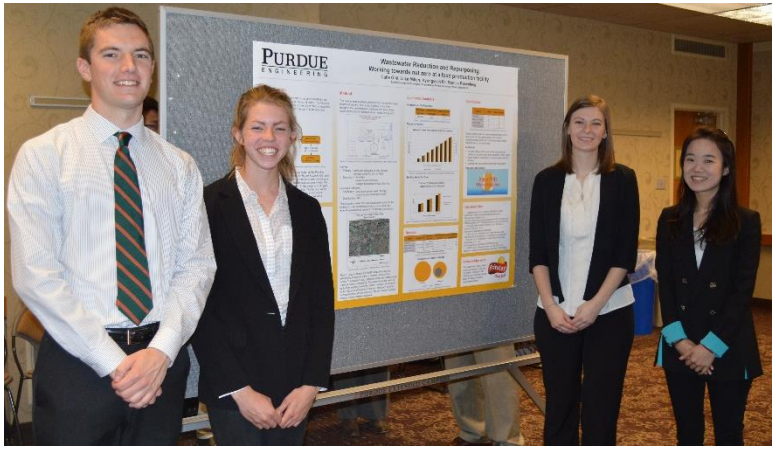
- **57% of EEE students are women (Fall 2015)**
- **Only environmental engineering degree at Purdue**
- **ABET accredited program ranked 13th in Environmental Engineering by US News and World Report**



PURDUE ENVIRONMENTAL & ECOLOGICAL ENGINEERING

Senior Design





- Company sponsored projects that allow students to address “real world” challenges and better prepare them for engineering profession
- Projects run entire academic year (two semesters)
- Great way to raise company visibility with EEE students
- Senior design topics: phosphorus compliance, combined sewer overflow, eco-facility design, innovating hazardous waste mgmt., industrial energy efficiency, water treatment design, LCA of manufacturing processes, reuse of wastewater treatment plant effluent

Graduate Program

- Approved August 2015
- Embodies EEE philosophy
- Masters and PhD degrees
- Combined degree option: can obtain BS and MS in 5 years for Purdue students
- Anticipated steady state size: 48 MS and 40 PhD students

Faculty

- 16 faculty
- Joint appointments in: CE, IE, ME, ABE, MSE, AGRY, and FNR
- Demographics: 30% female
- Selected Recognitions: Presidential Early Career Award for Scientists & Engineers; NSF Career Award; Fellows of ASME, ASCE, & SME; SME Outstanding Young Manufacturing Engineer Award; AAEES Excellence in Environmental Engineering Education Award; EPA Board of Scientific Counselors; WEF's Edgar Award for Pioneering Research

Research

Focused around two major themes:

- **Modern Environmental Engineering (contain, control, treat, mitigate contaminated media)**
- **Sustainable Industrial Systems (bridging disciplines to address environmental problems at their source)**

Recent Research Projects

- NSF RET Site: Sustainable Electronics
- Degradation Behavior of Ballistic Fibers and Related Polymer Materials
- Sustainability models for bioenergy systems
- Environmental Sustainability through Innovative Design and Operation of Digital Manufacturing Equipment
- Interaction of Fracking and Crude Oil Contaminants with Water Distribution Pipes
- Design of energy systems for resilient performance

Collaboration

- Internship and co-op opportunities
- Jointly address research challenges
- Senior design projects
- Support a graduate student on a company problem
- Industrial consortia
- Seminars, mentoring, service opportunities